

(6) The invention provides brushless dynamoelectric machines that enable conventional DC armature construction produced by long established fly winding techniques to be used without brushes to thus provide the long life characteristics of a brushless motor and a large potential reduction in manufacturing costs.

(7) The invention is based on a simple modification to the winding circuit of an otherwise generally conventional DC armature. Typically, the windings have coils distributed around the core of the armature, the individual coils being interconnected in a closed loop or ring circuit. In practicing the invention, each of three additional lead wires is connected to the coil circuit ring at points spaced angularly about 120 degree. Relative rotation between the armature and a surrounding housing shell is provided by bearings at opposite ends of the armature in a generally conventional manner. However, in most versions of the invention, the shell is arranged to rotate while the armature is caused to remain stationary. The three lead lines connected to the armature coil ring circuit are brought out of the housing shell from the coils through one of the end bearings. Since there is no rotation of the armature to which the wires are fixed, there is no need for brushes, a commutator or slip rings. The three leads, in certain disclosed embodiments of the invention, are all excited by three phase power developed by an associated power supply. In other disclosed embodiments where the dynamoelectric device is used, for example, as a brake rather than as a motor, the leads can be connected to a circuit that dissipates generated electrical power.

(8) The disclosed embodiments utilize components that are the same or are like those presently manufactured for DC machines and, therefore, affords great savings in tooling, including coil winding machinery, processing, assembly and inventory costs. The disclosed embodiments also have beneficial speed/torque characteristics, efficiency, power factor and/or power-to-weight ratio.

#### DRAWING DESCRIPTION:

##### BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a somewhat schematic exploded perspective view of a brushless electric motor constructed in accordance with the invention;

FIG. 1A is an enlarged view of the commutator end of the armature of the motor of FIG. 1;

FIG. 2 is an axial view of the armature of the motor of FIG. 1;

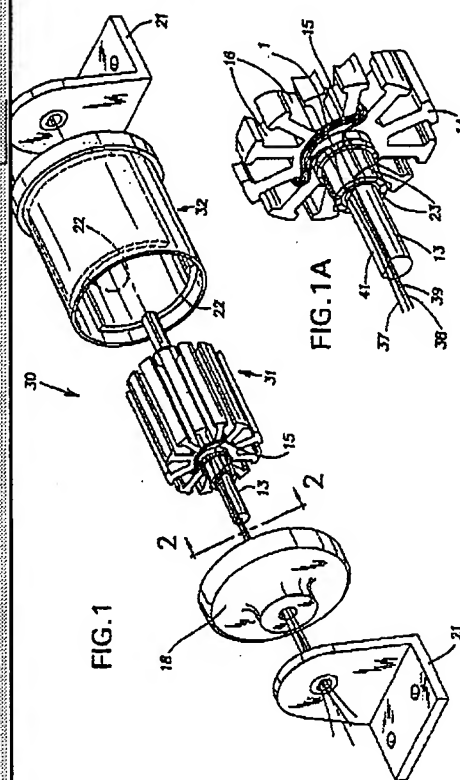
FIG. 3 is a cross-sectional view of the motor of FIG. 1 taken in a longitudinal plane;

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surface of the housing, the heat transfer fins adapted to receive ambient air flow in a manner that the heat transfer fins direct air flow into the channels between the heat transfer fins; a first cavity in the outer shell disposed to secure an electromagnet or a pair thereof having legs ending in a downwardly facing mating end face; a second cavity in the outer shell adapted to receive and secure therein an electronics package thereinto and fitted with an aperture at a connector face for electrical connection of the electronics package to a control unit.

(17) Preferably, the first cavity contains a pair of E-shaped electromagnets and includes electrical windings around the center leg of each electromagnet which are electrically connected to electrical and/or electronic components of an electronics package secured in the second cavity. The electronics in the second cavity are electrically connected to a control unit. When the housing is connected to a corresponding base which has a corresponding pair of E-shaped electromagnets for completing a pair of electromagnet cores, two channels are formed between the central leg and each outer leg through which signal conductor wires of a twisted pair cable are placed, so that the conductor wires are inductively coupled to the control unit via the electronics. Also preferably the outer shell of the housing is made out of thermally and electrically conductive metal, and includes a support member along a base-proximate face and an outer shell member assembled thereto. The outer shell member has an array of heat transfer fins placed at a 30.degree. to 60.degree. angle to the major axes of the housing. The heat transfer fins are oriented diagonally to the housing axes to advantageously utilize ambient air flow for heat dissipation when the coupler is mounted to a panel with its axes conventionally parallel to or orthogonal to the longitudinal axis of an aircraft for example, along which the twisted pair cable would be routed, which generally is parallel to ambient air currents.

(18) The invention itself, together with further objects and attendant advantages, will best be understood by reference to the following detailed description taken in conjunction with the accompanying drawings.

#### DRAWING DESCRIPTION:

##### BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a diagrammatic view of a data bus system;

FIG. 2 is an elevation view of a current mode coupler assembly of the present invention mounted to a panel;

FIG. 3 is a plan view of the coupler base in which is disposed a wire nest with electromagnets therein with the conductors of the twisted pair cable disposed in channels coursing around the central electromagnet legs;

#### United States Patent

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Attorney: [illegible]

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Field of Search: [illegible]

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